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Temperature and Magnetic Field Dependent Raman Spectroscopy of Transition-Metal Dichalcogenides J. R. SIMPSON, M. WATSON, Towson University, D. B. ROMERO, University of Maryland, H. BERGER, École Polytechnique Fédérale de Lausanne, A. R. HIGHT WALKER, National Institute of Standards & Technology (NIST) — Atomically-thin, transition-metal dichalcogenides (TMDs) offer potential for an alternative to graphene in advanced devices, owing to their unique electronic and optical properties. Such device applications require knowledge of the photo-thermal properties. Recently, we measured[1] the thermal conductivity for MoS_2 using a Raman-based optothermal technique. In the present work, we extend those measurements to related TMDs, including Ta-based compounds TaX_2, where X=Se or S, in both $1T$ and $2H$ crystallographic structures. Mechanical exfoliation from bulk crystals provides few- to single-layer flakes. We measure the Raman spectra of the exfoliated flakes using a novel magneto-Raman instrument, which affords measurement of the low-frequency vibrational modes of micron-sized samples as a function of both temperature (100 to 400) K and magnetic field (0 to 9) T. Dependence of the observed Raman-active phonons on temperature and magnetic field will be discussed and compared with earlier results on MoS_2.

[1]R. Yan, J. R. Simpson, *et al.*, ACS Nano **8**, 986 (2014).

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